

**ASSESSMENT OF THE KNOWLEDGE, ATTITUDES
AND PRACTICES ON QAT CHEWING AMONG
MEDICAL, PHARMACY AND DENTISTRY
UNDERGRADUATE STUDENTS IN ADEN
UNIVERSITY, YEMEN**

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UNIVERSITY SAINS MALAYSIA

2012

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By

MOHAMMED SALEH AHMED AL-KAFF

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال الله تعالى: (يَا أَيُّهَا الَّذِينَ آمَنُوا إِنَّمَا الْخَمْرُ وَالْمَيْسِرُ وَالْأَنْصَابُ وَالْأَزْلامُ رِجْسٌ مِنْ عَمَلِ الشَّيْطَانِ فَاجْتَنِبُوهُ لَعَلَّكُمْ تُفْلِحُونَ * إِنَّمَا يُرِيدُ الشَّيْطَانُ أَنْ يُوقِعَ بَيْنَكُمُ الْعَدَاوَةَ وَالْبَغْضَاءَ فِي الْخَمْرِ وَالْمَيْسِرِ وَيَصُدَّكُمْ عَنْ ذِكْرِ اللَّهِ وَعَنِ الصَّلَاةِ فَهَلْ أَنْتُمْ مُنْتَهُونَ) صدق الله العظيم (المائدة:90-91)

Allah said that (O YOU who have attained to faith! intoxicants, and gambling, and idolatrous practices, and the divining of the future are but a loathsome evil of Satan's doing; shun it, then, so that you might attain to a happy state! * By means of intoxicants and games of chance Satan seeks only to sow enmity and hatred among you, and to turn you away from the remembrance of Allah and from prayer, will you not, then, desist?) (Al-Ma'idah verse 90, 91)

DEDICATION

Praise is to Allah (S.W), prayer and peace is upon the master of the prophets and messengers prophet Mohamed (S.A.W). This work is dedicated to my good and patient parents: my mother Fatima Al-kaff and my father Saleh Al-kaff, my lovely wife Rowmooz and my cute children Maryam, Ahmed and Omar, my wonderful sisters Nadia and Nabiha, my lovely place Tareem city in Hadramout the cradle of childhood, my grateful to the beauty, magic and rebellious city... Aden.

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LIST OF ABBREVIATIONS

CNS	Central Nervous System
WHO	World Health Organization
UNNL	United Nations Narcotics Laboratories
KAP	Knowledge Attitude and Practice
PAIs	Privilege Access Interviewers
NGO	Nongovernmental Organization
SCL-90	Symptoms check list-90 questionnaires
ECG	Electrocardiogram
AMI	Acute Myocardial Infarction
MBP	Mean Blood Pressure
BMI	Body Mass Index
SPSS	Statistics Package for Social Science Software
No	Number
Yr	Year
SD	Standard Deviation
M	Meter
Cm	Centimeter
&	and
YR	Yemeni Riyal

LIST OF DEFINITIONS

- Student self perception about qat use
The individuals belief of own level of knowledge or information about qat plant.
- Poor knowledge
Students who were scored from 0 to 4 points had poor level of knowledge on the effects of qat use on human beings.
- Good Knowledge
Students who were scored from 5 to 9 points had good level of knowledge on the effects of qat use on human beings.
- Bad attitudes
Students who were scored from 11 to 18 points had bad attitudes on qat use.
- Moderate attitudes
Students who were scored from 19 to 26 points had an average attitude on qat use.
- Good attitudes
Students who were scored from 27 to 33 points had better attitude on qat use.
- Poor practice
Students who were scored from 8 to 21 points had bad practice about qat chewing.
- Good practice
Students who were scored from 22 to 40 had good practice about qat chewing.
- Qat use
Qat use was interchangeable with qat chewing in this thesis.

**PENILAIAN TERHADAP PENGETAHUAN, SIKAP DAN PRAKTIS
MENGENAI MENGUNYAH QAT DI KALANGAN PELAJAR-PELAJAR
PRASISWAZAH BIDANG PERUBATAN, FARMASI DAN PERGIGIAN DI
UNIVERSITI ADEN, YAMAN**

ABSTRAK

Pokok qat atau *Catha Edulis* Forsk adalah satu sepsis dalam keluarga pokok *Celastraceae*. Daun segar dan pucuk pokok qat mengandungi katinon, sejenis perangsang bak amfetamin yang bertanggung-jawab untuk kebanyakan tindakan farmakologinya. Antara tindakan-tindakan farmakologinya ialah meningkatkan keupayaan penumpuan, dan ini telah digunakan sebagai alasan untuk pelajar mengunyah qat. Tabiat ini juga boleh didapati dalam kalangan pelajar universiti terutamanya pelajar perubatan, farmasi dan pergigian. Walau bagaimanapun, seperti perangsang lain, katinon ini juga mempunyai keupayaan untuk menyebabkan ketagihan terhadap penggunaannya. Kajian ini bertujuan untuk menilai pengetahuan, sikap dan praktis terhadap penggunaan qat di kalangan pelajar-pelajar prasiswazah bidang perubatan, farmasi dan pergigian di Universiti Aden, Yaman.

Satu kajian keratan-rentas telah dijalankan melibatkan pelajar-pelajar perubatan, farmasi dan pergigian di Universiti Aden. Satu soaseslidik yang telah divalidasi diedarkan kepada semua pelajar menggunakan kaedah persampelan rawak mudah. Sejumlah 646 daripada 672 pelajar telah melengkapkan soaleslidik. Data dianalisa menggunakan Pakaj Statistik untuk Sains Sosial (SPSS) versi 15.0. “Chi-square” telah digunakan untuk menguji perhubungan di antara persepsi sendiri pelajar terhadap pokok qat dengan faktor sosio-demografi.

Keseluruhannya, kadar respons dalam kajian ini adalah 96.1%, dengan bilangan pelajar lelaki dan perempuan yang sama. Majoriti (85.3%) berumur kurang daripada 23 tahun. Pelajar perubatan mewakili 58%, pelajar-pelajar farmasi dan pergigian masing-masing adalah 20.7% dan 21.2%. Pendapatan mereka di dalam julat dari <6,000 ke >20,000 Y.R (Yemenis Riyal) sebulan. Majoriti (66.4%) daripada mereka berasal daripada negeri Aden dan lebih kurang 69.2% daripada mereka tinggal dengan keluarga. Kajian mendapati bahawa kebanyakan pelajar mempunyai persepsi sendiri yang rendah mengenai qat dan sumber persepsi sendiri ini adalah daripada ahli keluarga dan rakan-rakan. Hasil kajian juga menunjukkan majoriti pelajar (93.3%) mempunyai pengetahuan yang tinggi mengenai kesan penggunaan qat.

Kajian mendapati perhubungan signifikan antara pengetahuan mengenai kesan qat dengan jantina, bidang pengajian, tahap pengajian dan tempat tinggal pelajar. Walau bagaimanapun, tiada perhubungan signifikan antara pengetahuan dengan umur, pendapatan, sumber pendapatan dan daerah asal pelajar. Kajian ini mendapati yang majoriti daripada mereka (73.5%) mempunyai sikap yang lebih baik; dan 20.4% sikap sederhana; dan 6.0% mempunyai sikap yang kurang baik. Kajian mendapati perhubungan amat signifikan diantara sikap mengenai mengunyah qat dengan semua ciri-ciri sosio-demografi melainkan tahap pengajian. Hasil kajian telah menunjukkan 80% daripada subjek tidak bersetuju yang “penggunaan qat tidak menyebabkan masalah kesihatan”. Lebih kurang 89% setuju yang penggunaan qat boleh menyebabkan masalah sosio-ekonomi. Kajian telah mendapati 180 pelajar mengunyah qat dan selebihnya 466 tidak menggunakan qat. Majoriti (48.3%) pelajar menggunakan qat untuk meningkatkan prestasi minda dan selebihnya untuk rehat. Kebanyakan daripadanya mula

menggunakan qat ketika di sekolah menengah. Majoritinya mengatakan yang sumber qat adalah daripada ahli keluarga-saudara.

Kesimpulannya, tahap persepsi sendiri pelajar adalah rendah. Kajian mendapati terdapat perhubungan diantara sosio-demografi pelajar dengan pengetahuan dan sikap pelajar terhadap penggunaan qat. Walau bagaimanapun, tiada perhubungan didapati di antara sosio-demografi dengan praktis penggunaan qat. Kajian telah juga mendapati perhubungan diantara pengguna qat dengan pengetahuan dan sikap terhadap penggunaan qat di mana pengunyah qat didapati lebih berpengetahuan tetapi mempunyai sikap yang kurang baik. Akhirnya kajian juga telah mendapati korelasi positif diantara pengetahuan dengan sikap dan praktis.

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ABSTRACT

Qat plant or *Catha edulis* Forsk is a species belonging to the plant family *Celastraceae*. The fresh leaves and buds of the qat plant contains cathinone, an amphetamine like stimulants responsible for most of its pharmacological action. One of the pharmacological actions is the ability to concentrate, and this has been used as an excuse for the students to use qat. This habit also can be found among the university students especially medical, pharmacy and dentistry. However, as other stimulants, this cathinone also has the ability to cause dependence to the users. This study is aimed to evaluate the knowledge, attitudes and practices on qat use among health care related undergraduate students in Aden University, Yemen.

A cross-sectional study was carried out involving Medicine, Pharmacy and Dentistry students in Aden University. A validated questionnaire was distributed to all students using simple random sampling method. A total of 646 out of 672 students completed the questionnaire. The data were analyzed using Statistical Package for Social Science (SPSS) version 15.0. Chi-square was used to test the association of the student's perception about the qat plant with socio-demographic factors.

The overall response rate in this study was 96.1%, where male and female were equally represented. The majority (85.3%) of the students were less than 23 years old. Medical students comprised of 58%, pharmacy and dentistry students were 20.7% and 21.2% respectively. Their income ranged from <6,000 to > 20,000 Y.R per month. The majority

(66.4%) of them originated from Aden governorate, and about 69.2% of them were staying with their families. This study found that most of the students had low perception about the qat plant and the source of the student's perception was the family and friends. Results also showed that the majority of students (93.3%) had high knowledge on the effects of qat use.

The study found a significant association between the knowledge on the effects of qat with gender, field of study, level of study and residential of students. However, there was no significant association between knowledge with age, income, source of income and district of students' origin. The study found that the large majority of them (73.5%) had good attitude; and 20.4% moderate attitude; and 6.0% bad attitude. The study found strong significant associations between attitudes to qat use with all socio-demographic characteristics except the level of the study. The results showed that 80% of subjects have disagreed that "qat use doesn't cause health problems". Approximately, 89% agreed that qat use lead to socio-economic problems. The study found that 180 students were qat chewers and the other 466 were non-qat chewers. Most (48.3%) of the students were chewing qat to improve mental performance and others for relaxation. Most of them started chew qat at the secondary school. The majority said that the source of qat was the family-relative.

The study concludes that the level of student's perception about the qat plant was low. The study also found that there was an association between socio-demographic of the students with the knowledge and attitudes to the effects of qat use, however there was no association between socio-demographic factors with the practices of qat use. Study also found that the association between the qat use with the knowledge and attitude, where qat

chewers were more knowledgeable but have poorer attitude. Finally the study also found positive correlation between the knowledge with attitude and practice.

CHAPTER 1

INTRODUCTION

1.1 Introduction to the qat plant

1.1.1 History and origin of the qat plant

Qat was first described by the Swedish Botanist and naturalist Peter Forsk (1732-1763), who was a student of the father of taxonomy Carolus Linnaeus. Forsk was sent with some of his colleagues on a scientific expedition to Egypt, and one year later, they travelled to the Arabia Felix or Happy Arabia (Yemen now) to collect some botanical and zoological specimens. Qat was one of the specimens that he found there. He named this plant *Catha edulis*, of the Celastraceae family. Not long after, Forsk died in Yemen due to malaria. His companion Carsten Niebuhr (1736-1815), who was the only survivor of the expedition, called qat by the generic name of *Catha edulis* Forsk in his first botanical publication in memory of his friend (Kennedy et al., 1980; Al Motarreb et al., 2002; Dhaifalah and Santavy, 2004; Numan, 2004; Abdulwaheb and Muche, 2007).

1.1.2 Description and cultivation of the qat plant

Qat is an evergreen plant that grows in areas with an altitude of between 1500 and 2500 m above sea level. It is a slow-growing plant that reaches 1.5-20 m in height. Qat is cultivated in the highlands and rainfall regions and its evergreen leaves measure 5-10 cm long and 1-4 cm in width; it can survive for more than 50 years (Fig.1). The leaves have an aromatic odour and a slightly sweet taste. It can be cultivated throughout the year and is seedless, which could limit its distribution (Halbach, 1972; Varisco, 1986; McKee, 1987; Kalix, 1988; Al Motarreb et al., 2002; Odenwald et al., 2007).

1.1.3 Distribution of the qat plant

Qat grows in countries bordering the Red Sea of the eastern Africa, including Ethiopia, Kenya, Madagascar and the Arab peninsula (comprising southern Saudi Arabia and Yemen). Recently, qat has been cultivated in the other territories of Somalia, Djibouti, Tanzania, Uganda, Zimbabwe and Zambia, as well as Afghanistan and Turkistan (Halbach, 1972; Cox and Rampes, 2003; Karunamoorthi, 2010; Lamina, 2010).

1.1.4 Names of the qat plant

Most of the populations in these areas have chewed qat for centuries. Qat has been called by several names in western literature, depending on its origin: Qat, khat, Chat, Qaad, Jaad, Miraa, Mairangi, Cat, Flower of Paradise, Tohai, African salad, and Cathaand Tea of the Arabs (Cox and Rampes, 2003; El-Wajeh and Thornhill, 2009; Karunamoorthi, 2010). Qat is mainly consumed in the countries where it grows. However, during the last two decades, and due to the development of roads, network and air transportation, the qat chewing habit has rapidly spread into the Middle East, Europe and the United States of America. (Kalix, 1991; Mekonnen, 2006).

1.1.5 Chemical composition of the qat plant

The chemical structure of the qat plant has been studied since the nineteenth century. Katin was the first alkaloid to be found in the young green leaves of *Catha edulis* Forsk by Fluckiger and Gerok in the year 1887.

The researchers continued their investigations at the United Nations Narcotics Laboratories (UNNL) to determine the composition of qat up until the year 1975, when they isolated most of the components in the qat plant, including cathinone

(alpha-aminopropiophenone), which is an amphetamine-like substance. Cathinone is an unstable alkaloid that can be converted into cathine within 24 hours (Fig. 2). All in all, they found more than 40 alkaloids, glycosides, tannins, amino acids, vitamins and minerals (Halbach, 1972; Szendrei, 1980; Kalix, 1991; Cox and Rampes, 2003; Dhaifalah and Santavy, 2004).

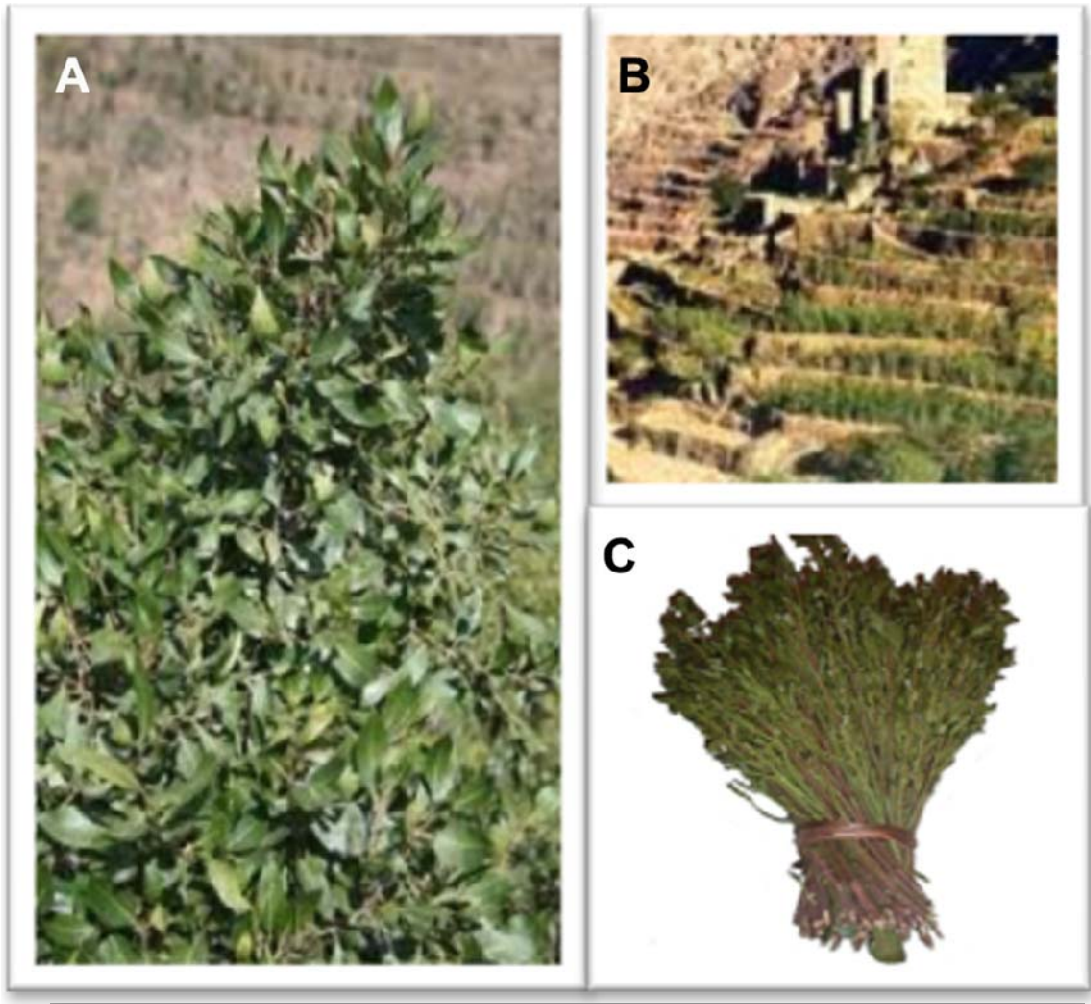
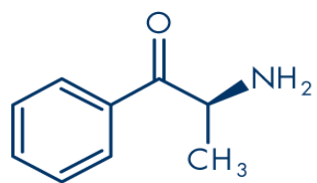
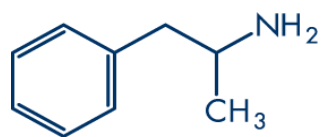


Figure1.1 The qat plant

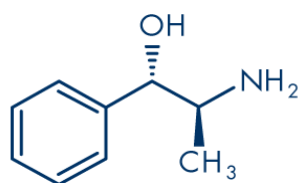
A) Picture of the qat tree. B) Cultivated of qat plant. C) Bundle of fresh qat.



Cathinone ↓



Amphetamine



Cathine

Figure 1.2 Molecular structures of cathinone, cathine and amphetamine

1.1.6 Action of cathinone

Cathinone, or alpha-aminopropiophenone, is believed to be the most active ingredient of the qat plant and has effects that resemble those of amphetamine. Cathine norpseudoephedrine, or phenylpropanolamine, was isolated from the *Ephedra* plant, which produces similar effects to those of qat's components. Cathine is a stable form of cathinone, with a milder psychostimulant action than cathinone. The fresh green leaves contain a higher proportion of cathinone. During the drying process cathinone is converted into cathine, which has milder effects than cathinone. To obtain better stimulation, users have to continually chew fresh qat leaves (Halbach, 1972; Kalix, 1987; Brenneisen et al., 1990; Kalix, 1994; Cox and Rampes, 2003; Patel, 2009; Al-Motarreb et al., 2010).

1.1.7 Pharmacological effects of the qat plant

Qat has psychological, medical and socio-economic effects on humans. Both cathinone and cathine exert their effects on two main neurochemical pathways: dopamine and nor-adrenaline; these effects resemble those of amphetamine. The main central effects of qat chewing are hyperactivity, euphoria, excitability, restlessness and anorexia. Regarding the cardiovascular system, a green leaf, which contains cathinone and cathine, has the capability to increase blood pressure and enhance heart rate. The effects of continuous habitual qat use on the gastrointestinal system include stomatitis, oesophigitis, gastritis and constipation. These gastrointestinal effects of qat could be related to the astringent effect of tannins. Regarding the genitourinary and reproductive system, cathinone reduces the flow rate of urine and, at the same time, induces libido, spermatorrhoea and erectile dysfunction. Studies have shown the significant incidence of low birth-weight full-term infants among the offspring of women who used qat during pregnancy

(Halbach, 1972; Luqman and Danowski, 1976; Kalix and Braenden, 1985; Kalix, 1990; Hassan, 2007; Patel, 2009).

The consumption of large amounts of qat can induce behavioural hypomania and psychosis syndromes, such as mania, schizophrenia, paranoid psychosis and symptoms of acute schizophrenia. The World Health Organization (WHO) commission on narcotics drugs has been receiving reports about the consumption of qat since 1946. However, due to ambiguity regarding the biological and social effects of qat, as well as confusion over literature and scientific studies regarding its chemical reactions, qat was placed under the list of dangerous and banned drugs by the WHO (Kennedy et al., 1980; Hassan, 2003).

In recent years, the qat chewing habit has spread to students in Yemen. The university students are unexceptional, especially those in highly competitive courses such as medicine, pharmacy and dentistry. However, the stimulant effect of qat is used by students to improve their performance in studies as they believe that qat can improve their ability to concentrate. Therefore, it is important to evaluate their views on this widespread habit in Yemeni society, and to evaluate and attempt to understand this inclination and its impact on health and the economy in Yemeni society.

1.1.8 The use of qat in different cultures

In Yemen and the south of Saudi Arabia, qat chewing is one of the traditional habits within communities. Qat chewing is very common as some people believe that it can overcome fatigue and depression and confer a euphoric effect for a more active lifestyle. In Ethiopia, people have used this plant to treat ailments such as depression or as part of their dietary requirements. The stimulant effect of qat is commonly used

by long-distance drivers; they usually chew qat whilst driving to stay awake as they feel that this gives them more energy and helps them to concentrate in their work (Al Motarreb et al., 2002; Melaku, 2009).

Qat use is endemic among some Yemenis, Somalis and some other minorities in Ethiopia and Kenya; qat use is not prohibited in Islam like alcohol, where alcohol use is very clearly stated in the Holy Quran (See Verse 219 in Surah 2 and Verses 90 and 91 in Surah 5, and the Hadith). However, there is a legal disagreement regarding the permissibility of qat use in Islam, where some scholars have deemed it impermissible while others (primarily Yemenis) do not see it as such. There are also specific usages of qat by some of the Yemeni community such as crafts and farmers (Kennedy et al., 1983; Kalix, 1984; Krikorian, 1984; Mekasha, 1984; Weir, 1985; Hassan, 2007).

1.2 Qat use in Aden

Qat use was not found among the Adeni community until the nineteenth century when qat chewing was brought in from Ethiopia and Somalia. Qat use among the Adeni started in a small area around Taiz (Aldalla and Yaffa), where qat was grown in small quantities. The political party governing in Aden tried to control qat use among Adenis in the 1950s. However, some illegal qat use was still reported, especially among foreign Arab workers, and this measure finally failed in 1958. After the British occupation in Aden, the People's Democratic Republic of South Yemen was established in 1967. The authority outlawed the use of qat in Aden except on Thursdays and Fridays. This law was very effective in controlling qat use among the people of Aden and in the People's Democratic Republic of South Yemen.

In the 1990, Southern and Northern Yemen became one country (unification) known as the Republic of Yemen. The new Republic replaced the old constitution and abolished the previous law on qat use, which had still been valid in Southern Yemen. Qat chewing became rampant and uncontrolled in Aden and many southern provinces, and the Yemeni government could not stop this phenomenon as the law did not prohibit the use of qat by the public. In some areas, qat cultivation and trading became a new source of income for the economy.

1.3 Problem statement

The qat chewing habit has been a part of social and cultural traditions for hundreds of years in the Yemeni society, despite its negative economic, social and health effects on qat users. The qat chewing habit involves the whole Yemeni society, including rich, middle class and poor people with low incomes. Most users become addicted to qat chewing and spend a large proportion of their income on qat, consequently depriving their families from obtaining their basic needs. Families can disintegrate when parents spend at least 4-5 hours outside or inside the house chewing, with the children left to roam around.

The effects of qat chewing on health start off gradually with mild central nervous system (CNS) effects; in the long term, it can lead to psychiatric disorders. The level of information, knowledge and awareness regarding qat chewing in Yemen is insufficient, and most information related to qat chewing has been obtained from other countries.

During the last two decades, the qat chewing habit spread among school and university students. At present, no guidelines on the risk of qat consumption are provided in the educational system, be it in schools or universities. The effects of qat

chewing should be included as a part of the educational system and should cover all aspects of related topics such as the health, social and economic effects of qat chewing on qat users, as well the overall effects on the country.

1.4 Purpose of the study

The purpose of this study was to assess the knowledge, attitudes and practices of medical, pharmacy and dentistry students in the College of Medicine and Health Sciences, Aden University, Republic of Yemen concerning the use of qat and its ill effects on health, society and the economy. This group of students was selected as they have a direct responsibility towards the health of the public at large, and they must serve as advisors and guides and provide a good influence on society.

1.5 Research questions

The questions posed in order to guide this study are outlined below:

1. What is the level of knowledge and attitudes and practices of students concerning qat use?
2. What factors can affect the knowledge, attitudes and practices concerning qat use?

1.6 Rationale of the study

The lack of information and knowledge among most people in Yemeni society, especially university students, on the health, social and economic effects of qat chewing has led to the widespread practice of qat chewing. This study explores the level of knowledge and attitudes and practices of qat chewing among health-care-related students in Aden University, Yemen.

The results from this study will be able to provide information related to the knowledge, attitudes and practices (KAP) and could be used as a basic guide by

related authorities for preparing remedial action. The outcome of this study could also be useful to both the Ministry of Education and the Ministry of Public Health for drafting effective outlines to reduce the problems associated with the qat chewing habit among Yemeni students.

1.7 Significance of the study

This study on the knowledge, attitudes and practices of medical, pharmacy and dentistry students regarding qat chewing is important because it will provide information on the magnitude of the problems related to qat use among medical, pharmacy and dentistry students in Yemeni society. This study will provide information related to the knowledge and awareness of qat chewing among health related students in the Yemen. The results could then be used to develop more comprehensive guidelines to overcome the qat chewing habit among Yemenis.

1.8 Research hypothesis

1. The students have a poor level of perception regarding qat plant.
2. There is no statistically significant association between knowledge of the harmful effects of qat use and socio-demographic factors.
3. There is no statistically significant association between attitudes to qat use and socio-demographic factors.
4. There is no statistically significant association between qat use practice and socio-demographic factors.
5. There is no statistically significant association between knowledge of the harmful effects of qat and qat use.

6. There is no statistically significant association between attitude to qat use and actual qat use.
7. There is no statistically significant association between socio-demographic factors and qat use.
8. There are no statistically significant correlations between knowledge, attitudes and practices concerning qat use.

1.9 Objectives of the study

1.9.1 General objective

The aim of this study was to assess the knowledge, attitudes and practices of medical, pharmacy and dentistry students regarding the use of qat. These students were chosen from three faculties: Faculty of Medicine, Faculty of Pharmacy and Faculty of Dentistry in Aden University, Yemen.

1.9.2 Specific objectives

The specific objectives of the study were:

1. To determine student's self perception regarding qat plant.
2. To evaluate their knowledge and attitudes towards qat use.
3. To analyse the associations between the knowledge, attitudes and practices regarding qat use and the socio-demographic factors of the students.
4. To analyse the association between socio-demographics and qat chewing practices.

5. To determine the correlations between knowledge, attitudes and practices regarding qat use.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to the adverse effects of qat use

2.1.1 Physical and psychological effects

The habit of qat chewing exerts diverse effects on humans, especially among those who use it frequently and intensively. These effects have led to physical and psychological impacts. Griffiths (1998), a British researcher, conducted a cross-sectional survey among 207 subjects of a Somali refugee community, aged between 18 and 78 years old. The subjects included people who were employed, people who had never worked, currently unemployed people and students. The study aimed to assess the patterns of qat use among Somalis living in London, using the Privileged Access Interviewers (PAIs) method involving Somalis interviewers who had the same social and cultural background.

This method is able to reduce cultural and language barriers during interviews, which are commonly encountered in research involving interviewers from different backgrounds. The study showed that problems due to qat use were more common in men. The study also found out that 90% of the qat users had mild to moderate sleeping problems, 74% complained of losing their appetite, 72% had mood swings, 47% suffered from anxiety, 44% suffered from depression, 20% complained of paranoia and 15% suffered from hallucinations.

A similar study was conducted by Patel et al. (2005) on 602 Somali refugees from most Somali communities in four cities in England (Birmingham, Bristol, Sheffield and London). The subjects were between 17 and 74 years old. The aim of

the study was to examine the level and nature of qat use by Somali people in these four cities, especially with respect to health perceptions, attitudes and its association with other illicit substances. The study used the same Privileged Access Interviews (PAIs) methodology. This study included a large number of male and female subjects and the sample size was more substantial than that in Griffiths' study. The study found that qat use was more prevalent among males and that the most common health problems related to qat use were sleeping difficulties in 65%, loss of appetite in 51% and 44% admitted having a strong desire to chew qat continuously.

Another study directed its research at the relationship between psychotic symptoms and qat abuse. Odenwald et al. (2005) conducted both a cross-sectional and a case-control study in Hargeisa city in Somalia. The study focused on households suffering from mental illness. A total of 612 households containing 4854 members, both male and female, were randomly selected from a total population of approximately 400,000. The interviewers were members of non-governmental organizations (NGOs) and staff from a local hospital who at the time had recently attended a 2-week training course. Clinical information was gathered by trained medical staff (Medical Officers).

The study discovered that those who had psychotic symptoms had usually started chewing qat at an earlier stage in life compared to the control group who did not have psychotic symptoms. The psychotic symptoms were also associated with the quantity of qat used (> two 'bundles' per/day). The study concluded that psychotic symptoms were more common among male chewers, and that this was related to excessive qat use.

A study in Yemen by Numan (2004) on the impact of qat use and its psychological effects was carried out on 800 Yemenis including students (472), state employees (242), the unemployed (35) and housewives (51). The subjects were selected using the systematic, random sampling method from three governorates included: Sana'a, Taiz and Aden. The researcher used a Symptom Checklist-90 questionnaire (SCL-90) designed to reflect psychotic patterns and medical and psychiatric responses in interviews on qat chewing habit.

The study did not find an association between psychiatric symptoms and qat use. However, males aged 21 to 31 years of age and subjects from urban areas had a higher incidence of psychiatric symptoms. This finding contradicted the results of other studies, such as the one by Griffiths.

In 2006, Gofu conducted a study to assess the prevalence of qat-induced psychotic reactions among 210 male agricultural college students in Addis Ababa. Interviews and questionnaires were used to collect the data from the students. The study found that the most habitual qat chewers had unwelcome psychotic phenomena following qat sessions, including hallucinations in 21.4%, depression in 43.8%, dizziness in 16.7%, impotence in 64.3% and anxiety in 48.3%. One of the limitations of this study is the lack of a prior psychiatric history of the respondents. Therefore, the study was not able to ensure that the psychiatric phenomena were really induced by qat use.

In order to understand preliminary information regarding the patterns of qat consumption and the bad habits associated with qat use by young Somali people in Sheffield, Nabuzoka and Badhadhe (2000) conducted a cross-sectional study among the Somali population in Sheffield. They used a modified method by Griffiths (1998)

to collect the data. Of the 154 individuals contacted, 94 were qat chewers: 89 males and 5 females. The findings suggested that the patterns of qat use among Somali immigrants may have changed from the usual patterns in their society. However, this study did not fully represent the Somali population in Sheffield as only a group of younger people was included. The problems associated with qat use among older Somali immigrants may be more significant than those found among the subjects of this study.

Another study was conducted in Sheffield and Birmingham by Kassim and Croucher (2006) among 75 Yemeni male volunteers. The study looked at qat use, dependency on qat, psychological functioning, nicotine dependency and other oral problems. The study used structure interviews that were given to daily qat chewers in the two cities. They found that qat use increased the dependency on tobacco smoking and nicotine. However, the study did not explain the mechanisms or associations related to this phenomenon of interdependency.

2.1.2 Qat use and oral problems

Many studies have tried to assess the relationship between qat use and oral problems such as oral cancer and gum disease. One of these studies was a cross-sectional survey conducted by Kassim (2009) in Sheffield, London. The subjects were 204 out of 4224 Yemeni, male, regular qat users, aged 18-87 years. The study looked at the factors that affect the practice of qat chewing and how these factors are related to self-reported oral problems. The participants were randomly chosen during their visits to qat sellers and a face-to-face structured questionnaire interview was given. The study concluded that 29% reported one current oral problem while 62% reported two oral problems.

The study also conclusively pointed out that the association between qat use and oral problems was unstable and that the low level of completed education of the subjects predicted self-perceived oral health problems such as tooth loss, gum disease and other deteriorating oral health conditions.

Ali et al. (2006) conducted a study to determine the relationship between qat use and smoking. They studied 33 Yemeni males and females, aged between 22 and 58 years old, who were using qat as well as smoking. The healthy control subjects were daily qat users who had often been seen with qat on one side of the mouth for more than 10 years. The study compared the histopathological changes in the oral mucosa of the affected and non-affected sites. Different degrees of histopathological changes in the oral mucosa due to qat use were found, along with side effects such as acanthosis in 88%, abnormal rete ridges in 70% and hyperparakeratosis in 67%. However, they did not explain the reason for such changes and therefore further investigations are required into the reasons for these histopathological changes in the areas exposed to qat and cigarette smoke.

2.1.3 Qat use and pregnancy

Different studies have reported that a number of the negative impacts of qat use can affect the reproductive health system and pregnancy, including loss of libido, sexual impotence, inhibition of uterus-placenta blood flow and underweight newborns. Khawaja et al. (2008) conducted a cross-sectional study among 11,435 Yemeni married and pregnant women aged 15-49 years old who had had at least one live birth during the 5 years prior to the survey. They used well-trained female Yemeni interviewers with the usual macro international ethical field procedures. The study explored the prevalence of women who chewed qat during pregnancy and the risk factors that contributed to this habit.

The findings showed that 40.7% of women reported chewing qat while they were pregnant during the 5-year period prior to the trial. Among the risk factors identified were residing in a rural area, a lower level of education, a lower level of wealth and older age. This finding is obvious because qat is more accessible in rural areas where it is cultivated and exported from. In addition, people who live in mountainous rural areas are not exposed to education and are therefore less knowledgeable. However, the main limitation of this study was that they did not use a direct wealth assessment method such as household incomes or salaries. Furthermore, the study did not evaluate the effect of qat use on newborn children.

Another study on the effect of qat on pregnancy was conducted in Yemen by Abdul Ghani et al. (1987), who used midwives to administer the questionnaire to the pregnant women in a maternity ward. The study highlights the background of the mother as well as the newborn children. A total of 1181 consecutive deliveries were recorded and included in the study. The findings showed that 830 of the 1181 deliveries resulted in full-term, healthy babies. However, the babies of qat-user mothers were found to have significantly lower birth weights than babies of non-qat users. This study did not separate the effects of other co-founding factors on birth weight, such as smoking, socio-economic background and others.

In addition, Kuczkowski (2005) revealed the effect of qat use on pregnancy. A case study was undertaken of 22-year-old pregnant woman who developed unexplained chest pain, tachycardia and premature ventricular complexes. Further investigation found that she had used qat a few hours prior to admission. However, this case study did not provide other details concerning the outcome of the study.

2.1.4 Qat use and blood pressure

In order to determine the effects of smoking cigarettes, drinking alcohol and qat chewing on blood pressure, Tesfaye et al. (2008) performed a descriptive cross-sectional study in Addis Ababa on 4001 men and women, aged between 25 and 64 years old. The researchers used the WHO STEPS method with a pretested and standardized survey instrument to collect the data. Weight, height and blood pressure were also measured. The study exposed a significant correlation between smoking and concurrent qat chewing, which was common among men with elevated diastolic blood pressure. The study only concentrated on urban areas in Addis Ababa, where there are lots of other co-founding factors that could also affect blood pressure. Studies using samples from other areas in Ethiopia and the exclusion of irrelevant co-founding factors might be more useful.

Laswar and Darwish (2009) performed another study to evaluate the effect of qat and smoking on blood pressure and the body mass index. They conduct a cross-sectional study among male Medical students 18-28 years old in Aden University, Yemen. The findings showed weak correlations between the frequency of qat use and mean blood pressure (MBP) and BMI.

2.1.5 Qat use and cardiovascular diseases

Al Motarreb et al. (2005) conducted a case-control study of 100 men and women patients in the intensive care unit, aged between 20 and 79 years of age, between 1997 and 1999. The questionnaire was given by the doctors to both case-control and control groups, which covered the personal history of qat use, smoking, hypertension and diabetes. The investigation used ECGs and blood samples, which were collected to gather blood profiles and data on related enzymes. The study found that the risk factor of acute myocardial infarction (AMI) was related to the quantity,

duration and frequency of the chewing sessions. This relationship was found to be stronger with both smoking and qat chewing. A randomized study with larger sample sizes to prove the relationship between AMI and qat chewing, as well as smoking, would be useful.

2.1.6 Qat use and gastrointestinal problems

El Gunied et al. (1991) performed a case-control study among 70 Yemeni males and females to look at the association between qat use, alcohol intake and smoking habits and upper gastrointestinal problems. The subjects were aged between 18 and 73 years old. Biopsies of the oesophagus, stomach and duodenum of those who chewed qat on a daily basis and smoked showed a high prevalence of oesophageal dysplasia, gastric hyperplasia and duodenal ulcers. However, this study did not assess the pathophysiology of the problems and, having said that, further studies to evaluate the pathophysiology of the problems found are indicated. A study on the use of qat and its effects on gall stones by Murugan et al. (2003) found no significant effect of qat use on gall stones. Furthermore, this study used a very small sample size. Further investigations into the effects of qat use on gallstones would be useful.

2.1.7 Qat use and diabetic mellitus

In order to investigate the effect of qat use on diabetes, Saif-Ali et al. (2003) conducted a study using 72 Yemeni males and measured the levels of C-peptide as the end point. The authors found that both plasma glucose and C-peptide levels were higher about 1-2 hours after a qat chewing session. In contrast, a study by Taleb and Bechyne (2009) found that qat use significantly reduced blood glucose. This study also used a small sample size (30 males). However, the general belief among

Yemenis is that qat use will reduce blood glucose. Therefore, a more systematic study with a larger population is needed as testimony to this claim.

2.1.8 Qat use and sexual behaviour

In Ethiopia, Kebede et al. (2005) carried out a study on in-school and out-of-school youths regarding the relationship between their sexual behaviour and substance use. Stratified random sampling (20,434) based on the size of this population was used to select both in-school and out-of school youths. The interviewer who collected the data was intensively trained for one week about the interview process and on how to administer the validated questionnaire. The study found that 10% of in-school and 23% of out-of-school youths were using qat. The study also found that 82% of the youths had a sexual experience and, of these, 1.4% of in-school and 20% of out-of school youths had unprotected sex within 12 months prior to the interview. Among the factors that contributed to this behaviour were gender (male), younger age (15-19 years), being out of school, consuming alcohol and qat use. Qat use 4 weeks prior to the interview was evaluated, whereas sexual experiences since puberty were assessed. Although this study found an association between qat use and sexual behaviour, the study could not explain the exact reasons behind it. This could be due to the difference duration of the exposure to qat and behaviour changes. Further study that follows the pattern sexual behaviour after the exposure to qat would be able to better explore the reasons behind such an association.

2.2 Qat chewing practices

A study by Laswar and Darwish (2009) among male Medical students in Aden University, Yemen, showed that the frequency of qat chewing increased from 35% in the first year to 90% in the fifth year, while smoking also doubled from 20% in the first year to 40% in the fifth year. Odenwald et al. (2007) found that drug abuse and qat use are common trends among Somali military personnel. They conducted a cross-sectional study in seven different regions of Somalia and assessed the use of drugs such as cannabis, psychoactive tablets, alcohol and qat among Somali military combatants. The study also used local trainers as interviewers and a standardized questionnaire that included basic socio-demographic data and self-reported self-perceptions of qat use. A total of 8124 males were involved in this study. The levels of drug abuse and qat use were evidently more common in southern Somalia than in other parts of the country.

The habit of qat chewing was also noticed among Yemeni Jewish who migrated to Israel. A study was performed by Litman et al. (1986) among 136 Yemeni households consisting of Jewish immigrants in two Israeli villages. It included all inhabitants of Yemeni households, aged between 15-65 years old. Two trained nurse interviewers administered the questionnaire. The study found that about 39% of Yemeni immigrants used qat and that qat use was more common among men. The rate was found to increase with age, but was inversely proportional to education levels. Surprisingly, the study did not find any association between qat use and psychopathological abnormalities.

Qat is sometime used together with other addictive drugs and alcohol. A study by Omolo and Dhavphale (1987) demonstrated a significant relationship between the degree of alcohol intake and the degree of qat use. They investigated 50 male and 50

female patients in Kenya who had some type of medical disorder and were aged between 12 and 65 years old. The study discovered that 29 out of 100 had consumed qat and alcohol together. Another study found a strong association between qat chewing and cigarette smoking. Kebede (2006) conducted a cross-sectional study among 1103 students in northwest Ethiopia. The findings showed that 13.1% of the students smoked, 26.7% used qat and 10.9% both smoked and chewed qat. The study also discovered that the rate of smoking and chewing qat increased with years of study. However, most of the students (94.4%) believed that smoking and qat chewing posed health risks.

The practice of qat chewing is also affected by region, where the prevalence is higher in more developed areas than in rural ones. Accessibility to qat also contributes to the prevalence of its use, as found in a study by Ageely (2009) in the Kingdom of Saudi Arabia, with a sample of 10,000 colleges and secondary school students aged between 15 and 25 years old. The findings showed that the prevalence of qat chewing was greater in urban areas (24.5%) than in rural areas, where the prevalence was 20.5%. The study noted that the prevalence of qat chewing increased in agricultural areas, where it was 63.90% greater than in the other provinces. Furthermore, the study also showed that the use of qat was significantly associated with age, gender, place of residence of the students.

According to Melaku (2009), who conducted a study on university students in Ethiopia, 31.2% of the respondents used qat, half of them chewed qat once or more per week and that 40% chewed on a daily basis. This study evaluated 269 students, of whom 81.1% were male. About 43.3% used qat to improve their study performance and 31.3% used it for relaxation. Qat use was found to result in

sleeplessness and loss of appetite, and other health problems included anxiety, depression, lethargy and hallucination. The study also revealed that most of the qat users also smoked cigarettes and consumed alcohol. This finding is similar to the results of a study conducted on university staff in Ethiopia.

The study in Ethiopia by Gelaw and Haile-Amlak (2004) showed that the prevalence of lifetime qat users among the staff of Jimma University was 46%, whereas the current prevalence of qat chewing was 30.8%, and the prevalence remained higher among males (33.0%) than females (20.0%). Qat chewing was also associated with other substance abuse, such as alcohol consumption and tobacco smoking. Qat chewing habit resulted in cases of missing work (50.4%) and being late for work (54.5%).

A similar finding was discovered among Yemeni university students by Al-Hanani (2004). He conducted a study at Sana'a University to evaluate the KAP of students using illicit drugs, including qat. A total of 3263 students comprising equal numbers of male and female students were asked to participate. The study found that 81.1% of male and 25.9% of female students had taken qat in addition to cigarette smoking, alcohol consumption and other illicit drug use. About 2.3% of female and 38.2% of male students used qat on daily basis. Interestingly, the study also learned that about 19.8% of female and 35.1% of male students were not willing to stop using qat. Similarly, qat use was also associated with tobacco smoking, alcohol consumption, shesha smoking and substance abuse.

Another study was conducted in Yemen by Bawazeer (1993), who studied the prevalence of qat abuse among 498 medical students in Aden University. The author reported that the prevalence of qat chewers was 17.2%, where 29.2% were male and